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ABSTRACT

Alternative procedures for assessing college student educational progress and sources of additional information are presented. Traditionally, written tests have been used for assessing educational progress at the college level, but it is now common to think in broader terms of the specific developments and attainments that students are expected to achieve. Educational learning could include the imparting of attitudes and values, value clarification, confidence and self-concept development, development of various personality characteristics, development of improved interpersonal sensitivity and functioning, and the development of occupational habits and skills. Assessment is defined as broader than measurement but narrower than evaluation. The design of an assessment for a particular course, program, or institution should be unique and tailored specifically to the situation at hand. Some general models available that can be modified to meet local needs are described. The need to use multiple measures, or indicators, for a particular learning outcome and more than one method of data collection are desirable. It is usually better to develop local instruments tailored to local needs. Locally-developed, criterion-referenced, paper-and-pencil tests are more frequently of use to colleges and universities than are norm-referenced tests. A number of other types of assessment methods are outlined. (SW)

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ASSESSING STUDENT EDUCATIONAL PROGRESS

Oscar T. Lenning

Assessment of student educational achievement has always been a *necessary* function within postsecondary education institutions. Its importance is as great today as it ever was. However, there are several current conditions that make reevaluation of the procedures being used for such assessments highly desirable: more diverse groups of students are entering postsecondary education, complaints about test bias and high attrition rates continue unabated, and a decrease in the size of the traditional age student pool is imminent. The major purpose of this issue of *Research Currents* is to call attention to these alternative procedures for assessing student educational progress and to point out where one can go for more information.[1]

The "What" and "Why" of Such Assessment

Traditionally, student educational progress in college has been thought of primarily in terms of written and oral communication competency, intellectual competency, and increased knowledge and understanding. It is now common to think in broader terms, of the specific developments and attainments that students are expected to achieve in a course or program offered by a postsecondary education institution. Payne (1974) refers to both cognitive and affective outcomes of a course or program in his book on "the assessment of learning"; Ebel (1972) insists that all affective development involves a cognitive component, which he contends is what makes it learning. Either way, educational learning could include the imparting of attitudes and values (Kohlberg 1973), value clarification, confidence and self-concept development, development of various personality characteristics, development of improved interpersonal sensitivity and functioning, development of skills ranging all the way from learning to relax to complex theory and model development, or the development of occupational habits (such as punctuality) and skills (from flower arranging to use of sophisticated technology). Educational progress is a broad concept and includes a host of student changes and attainments that result from *planned* course and program activities and that occur in and outside the classroom.

Assessment is a term that was made popular by psychologist Henry Murray and his associates in the late 1930's; they developed theories regarding personal need and methods for determining such need. It refers to the appraisal of persons or specific aspects of persons, like their academic achievements. Some assessment specialists have limited their focus to measurement; others relate assessment to developing an understanding of "change" and to conceptualizing courses of action to foster greater change—they equate it to evaluation. As used here, assessment is defined as broader than measurement but narrower than evaluation. By assessing student educational change or progress we mean that such achievement is being measured, analyzed, and appraised, and that potential implications of this achievement are being explored; but alternative or suggested decisions regarding courses of action that may be implied are not laid our during the assessment process—they are left to the evaluation phase.

Conducting Assessments of Educational Progress

Payne (1974) lists seven generally accepted steps in assessing cognitive and affective learning: (1) specifying detailed goals and objectives, (2) designing the assessment system, (3) selecting data-gathering methods, (4) collecting data, (5) analyzing and summarizing data, (6) contrasting data and objectives, and (7) feeding back results.

As Palola and Padgett (1971) have stated, "too little attention is paid to defining the aims of the educational process beyond coining global abstractions" (p. 7). A point project conducted by the Council for the Advancement of Small Colleges and NCHEMS found this is a difficult problem for many people, and especially for faculty members in a number of disciplines who are used to thinking primarily in terms of process rather than outcomes (Lenning 1977; Lenning and Lundin 1977). At the program or institutional level, consensus procedures become important for this process—whether it be general group discussion or more structured approaches, such as card sorts or modified Delphi techniques.

Adequate assessment design is crucial to the entire effort. For every assessment a plan is needed that outlines the purposes of the assessment, the context in which it will occur, the questions that need to be answered, the data to be gathered, the data sources, data gathering and analysis procedures, methods of feedback, costs, how everything fits together into an integrated system, etc. The design must be realistic, feasible for the costs and effort required, as well as effective in providing the information needed to answer pertinent questions. It must identify and provide a rationale concerning which specific groups of students should be assessed, which areas of attainment and development are to be assessed for each group, and how the assessment procedures and strategy will vary by group. For example, assessing older students' intellectual progress using an instrument normed on teenage college students' performance would be clearly inappropriate.

[1]For an earlier treatment of this overall topic, see Lenning (1976)

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The design of an assessment for a particular course, program, or institution should be unique and tailored specifically to the situation at hand. There are a variety of general models available that can be modified to meet local needs. At Empire State College Palola and Lehemann, (1976) developed a comprehensive learning assessment system that includes such data as student self-report, instructor observations, writing samples, and standard and local tests. It is a longitudinal approach and relates learning outcomes to costs, as well as a variety of other factors; it also suggests strategies and procedures for such things as sampling, data collection, analysis and dissemination, and data use. Palola and Lehemann make the point that the mere reporting of the data will not lead to data use. For each decisionmaker, the data should be changed into a brief, succinct, informational report having an appropriate format and content that speaks directly to his or her concerns.

A quite different model was developed by the Division of Occupational Education Instruction in the New York State Education Department (1976). They developed useful guidelines and procedures for assessing cognitive, psychomotor, and affective outcomes within two different contexts: (1) when assessment is used to assign grades, and (2) when assessment is used to evaluate and plan instruction. They concluded from their study that paper-and-pencil tests should be used for cognitive assessment in both contexts; performance tests should be used for psychomotor assessment in both contexts; and questionnaires, inventories, logs, diaries, and anecdotal records should be used for "affect" assessment, but only in the area of evaluation and planning instruction.

Recently, other assessment models have appeared. For example, Pottinger and Klemp (1975, 1976) developed a General Integrative Model that involves the use of several tests and measures for evaluating the integration of life skills within students, and which investigates how students process and integrate information as contrasted to storage and retrieval of information. Hulsart (1975) applied the National Assessment of Educational Progress model to the classroom for use by teachers and students to assess educational progress. In this case, both performance and written tests are used. Still another example is a model promoted by Rivas (1976) for using assessment to test hypotheses about skill development. Hypotheses to be tested can come from reviewing the literature, interviewing experts in the field, critical examination of previous assessment results, or qualitative (observational) field research prior to quantitative assessment.

The Many Options in Choice of Measures

One cannot have assessment without measurement of some kind; however, all measures have weaknesses. Many measures, in particular those in the affective area, should probably be referred to as indicators so that their relative imprecision is made apparent. Thus, it is a good idea to use multiple measures, or indicators, for a particular learning outcome, unless one has complete confidence in one of the measures. More than one method of data collection is also desirable, assuming it is economically feasible, because all data collection methods have strengths and weaknesses that vary from method to method and because some work better with different kinds of groups than do others. The use of multiple methods means that where one is weaker another can be stronger; also, the data collections system can be tailored to the characteristics of the diverse groups for which progress is being assessed.

It is usually desirable to develop local instruments tailored to local needs. There are an abundance of excellent books on standard measurement theory and the construction of norm-referenced tests and the diversity is such that both experienced and inexperienced instrument developers can be served. However, important new knowledge in this area becomes available yearly, so it is desirable that the person responsible for consulting with faculty and staff about their assessment problems and procedures also be assigned to keep up-to-date on such developments, Examples of noteworthy developments are: Rowley's (1974) finding that multiple-choice tests favor certain types of students over others; Ebel's (1970) finding that true-false tests are preferred for some types of purposes and content; Anderson's (1974) finding that close measures are useful for certain assessment tasks on the local campus; Wagner's (1976) finding that there are benefits as well as problems with having students construct their own classroom exams; Wittmaier's (1976) finding that written, critique "evaluations" placed in a student's file in lieu of grades gives more incentive for his students to do effective work than is true with pass/fail grading; and Shannon's (1975) finding, for his students, that matching tests have a special advantage over multiple-choice tests in assessing partial knowledge. Shannon also found that the premises in a matching test should be organized into groups of five—more than that number of premises per group may mean that student skills not of concern, such as reading comprehension, attentiveness, and organization, will be tested as much as the knowledge and skills of concern.

As illustrated by Lange, Lehemann, and Mehrens (1967), revising items takes less time, effort, and expense than developing items from scratch. So the sharing of items among departments and institutions and the use of test-item storage banks that are flexible and can be easily accessed is to be encouraged; however, great care should be taken to modify items appropriately for any new context. Books containing collections of experimental and/or empirically tested items and scales for particular areas of concern are another source of aid. Lenning (1977) identified some available source books in the areas of attitudes, social functioning, occupational attitudes and characteristics, occupational education achievement, psychological characteristics, and self-concept, (and provide cautions regarding their use). Other resources are Micek, Service, and Lee (1975) and Pace (1975).

Locally-developed, criterion-referenced, paper-and-pencil tests are more frequently of use to colleges and universities than are norm-referenced tests. Unlike norm-referenced tests, which attempt to rank and discriminate among students, criterion-referenced tests focus exclusively on either the level of performance or mastery. Among several useful books on this topic, the one by Gronlund (1973) on developing classroom criterion-referenced instruments is "must" reading. As pointed out by Airasian and Madaus (1972), the most difficult problem in this kind of assessment is determining what should be the minimum, expected, and desired level of performance. Thus far, people have had to rely on experience, expert opinion, item content validity, and/or group consensus for such standards. For examples of criterion-referenced tests, see Knapp (1974).

In many areas paper-and-pencil tests are less appropriate than other methods. Supplementing paper-and-pencil tests by other types of data-gathering methods is especially desirable in areas such as knowledge, understanding, and analytical thinking, as demonstrated at Empire State College. Fifty such assessment mechanisms were mentioned in the literature:
anecdotal records; audio-visual media procedures; behavioral events analysis; card sorts; case studies, charette; checklists; computer analysis; computer-assisted instruction; concerns conferences; confrontation exercises; critical incident technique; diaries; fact finding and decisionmaking exercises; games (board games and

otherwise); group interviews; group problem-solving exercises; in-basket techniques; institutional records and other secondary data; interview simulations; inventories; job-element analysis; leaderless group discussions; logs; on-the-job assessment by supervisors; opinion polls; oral exams; oral presentations; organizational climate technique; performance tests; product testing and assessment; programmed cases; questionnaires and rating forms; rating of expert judges or others; ratings of self; recording observed behavior or other observations; reverse flow conferences; role playing; self-monitoring; self-observation reports; simulation games; simulation models; speak-ups; staff conferences; stress interviews; structured interviews; unobtrusive measures; unstructured interviews; work samples; written diagnostic and trouble-shooting exercises. Some helpful discussions of other methods are also available, as follows: many of the methods listed (Knapp and Sharon 1975); opinion polls, speak-ups, group interviews, concerns conferences, reverse-flow conferences (Witkin 1975); use of motion pictures, television, photos, kinescope, and videotape for testing (Edling 1968); programmed cases and organizational climate technique (Pottinger and Klemp 1975, 1976); questionnaires (Oppenheim, 1966; Tull and Albaum 1973; Bower and Renkiewicz 1977); behavioral events analysis (McClelland 1974; Pottinger and Klemp 1975, 1976); job elements analysis (Primoff 1973; Pottinger and Klemp 1975, 1976); computer grading of essays (Levy and Fritz 1972; Slotnick 1972); records and other secondary data (Boyd and Westpahll 1972); self-report (Bzird, 1976); direct approaches to observing and recording behavior (Boyd and DeVault 1966); use of self-charts of course progress (Swenson 1974); objective scoring key for composition (McGowan 1976); innovative grading practices (Smith 1976); self-monitoring alternatives and their effect on achievement (Mount and Tirrell 1977); and staffing conference assessment and its effect on achievement (Kelly and Dowd 1975).

There is a new and growing phenomenon in postsecondary education that should have a significant impact on assessment strategies: assessment of competencies pertinent to real life situations. In two excellent documents, Pottinger and Klemp (1975, 1976) provide a number of competency-based measures of cognitive, affective and social outcomes that have been validated and tested in both academic and "life" settings.

Furthermore, the American College Testing Program is using an Adult Performance Level Program that incorporates a paper-and-pencil instrument to access "functional competency," or the ability to perform the wide variety of tasks required in modern society. They have also developed and pilot tested an open-ended battery using films, videotapes, and audio cassettes to measure the desired general education outcomes of communication, problem solving, and clarifying values as they apply to the three "life" areas of functioning in social institutions, using science and technology, and using art. They also have developed but not yet tested an objective paper-and-pencil version of the battery.

Educational Testing Service has developed but not yet validated a paper-and-pencil instrument that is designed to measure competencies of college students in the areas of communication, analytic thinking, synthesizing ability, and social-cultural awareness. Students respond to open-ended questions about specific problem or situational cases. The instrument is easy to administer and requires minimal training and expertise.

The CUE Center at Bowling Green State University also has developed a number of single-domain instruments for assessing generic competencies that are proactive; for example, critical thinking in managing confrontations and creating one's own discrimination. These instruments have been tested in a preliminary manner and found quite useful (see Whimbey (1976)).

Conclusion

While traditionally written tests have been relied on almost exclusively in most segments of higher education for assessing educational progress, there are some assessment mechanisms used in traditional academic courses that are not of this variety. Examples of exceptions are in physical education, speech and drama, writing classes, art and music, professional internships and practicums, and many vocational-technical programs, where direct observation of student performance or products often constitutes the primary means of assessment. Today, a wide variety of methods and approaches to assessing student educational progress are now available. College administrators and faculty need to consider these various approaches—many of them practical and cost-effective—as alternatives and supplements to methods they now rely on for assessment of student progress in coursework and programs, and for institution-wide assessment. The products of our educational system are subject to an extremely narrow range of assessment devices. In fairness to the true achievement of students it is highly recommended that . . . colleges and university officials and faculty members have become familiar with the potential uses and benefits of the nontraditional assessment procedures outlined in this survey.

BIBLIOGRAPHY

Airasian, P. W., and Madaus, G. F. "Criterion-Referenced Testing in the Classroom" *NCME Measurement in Education* 3 (May 1972): 1-8.

Anderson, T. H. "Cloze Measures as Indices of Achievement Comprehension When Learning from Extended Prose." *Journal of Educational Measurement* 11 (1974): 83-92.

Baird, L. L. *Using Self-reports to Predict Student Performance*, New York: College Entrance Examination Board, 1976.

Bower, C. P. and Renkiewicz, N. K. *A Handbook for Using the Student Outcomes Questionnaires*. Boulder, Colo: National Center for Higher Education Management Systems, 1977.

Boyd, H. W. and Westphall, R. *Marketing Research*. 3rd ed. Homewood, Ill.: Richard D. Irwin, Inc., 1972.

Boyd, R. D., and DeVault, V. "The Observation and Recording of Behavior." *Review of Educational Research* 36 (1966): 529-551.

Council on Postsecondary Accreditation. *Evaluation of Institutions of Postsecondary Education: An Annotated List of Instruments*. Washington, D.C.: The Council on Postsecondary Accreditation, 1975.

Ebel, R. L. "The Case for True-False Items." *School Review* 78 (1970): 373-389.

_____. "Can Teachers Write Good True-False Test Items?" *Journal of Educational Measurement* 12 (1975): 31-35.

Edling, J. V. "Educational Objectives and Educational Media." *Review of Educational Research* 38 (1968): 177-194.

Gronlund, N. E. *Preparing Criterion-Referenced Tests for Classroom Instruction*, New York: Macmillan, 1973.

Hulsart, R. "Using the National Assessment Model for Classroom Evaluation." Denver, Colo: National Assessment of Educational Progress, April 1975. ED 135 839. MF-$1.03; HC-$2.36.

Kelly, F. D., and Dowd, E. T. "The Staffing Conference: An Approach to Student Evaluation." *Counselor Education and Supervision* 15 (1975): 135-139.

Knapp, J. *A Collection of Criterion-Referenced Tests.* T. M. Report No. 31. Princeton, N.J.: ERIC Clearinghouse on Tests, Measurements, and Evaluation, 1974. ED 099 427. MF-$1.03; HC-$1.97.

_____, and Sharon, A. *A Compendium of Assessment Techniques.* Princeton, N.J.: Educational Testing Service, 1975. MF-$1.03; HC-$1.97.

Kohlberg, L. "The Development of Moral Stages: Uses and Abuses." *Proceedings of the 1973 Invitational Conference on Testing Problems.* Princeton, N.J.: Educational Testing Service, 1973.

Lange, A.; Lehemann, I. J.; and Mehrens, W. A. "Using Item Analysis to Improve Tests." *Journal of Educational Measurement* 4 (1967): 65-68.

Lenning, O. T. *The Outcomes Structure: An Overview and Procedures for Applying it in Postsecondary Education.* Boulder, Colo: National Center for Higher Education Management Systems, 1977.

_____, "Assessing Student Progress in Academic Achievement." In L. L. Baird (Ed.), *Assessing Student Academic and Social Progress: New Directions for Community Colleges.* San Francisco: Jossey-Bass, 1976.

_____, and Lundin, E. G. "Preliminary Tryouts of the NCHEMS Outcomes Structure at Four Colleges." In R. H. Fenske (Ed.), *Proceedings of the 1977 International Forum on Research and Planning in Higher Education.* Tallahassee, Florida: Association for Institutional Research, in press.

Levy, L. B., and K. V. Fritz. *Status Report on the Computer Grading of Essays.* Madison: University of Wisconsin, Counseling Center, June, 1972. ED 069 759. MF-$0.96; HC-$1.97.

McClelland, D. C., and Kemp, G. *Report to the Executive Office of Manpower Affairs on the Validation of a Human Service Workers Test.* Boston: McBer and Co., 1974.

McGowan, M. "Objective Evaluation of English Composition." Doctoral Dissertation, Louisiana State University, 1976. ED 136 282. MF-$0.96-HC-$11.37.

Micek, S. S.; Service, A. L.; and Lee, Y. S. *Outcome Measures and Procedures Manual.* Field Review Edition. Boulder, Colo.: National Center for Higher Education Management Systems, 1975.

Mount, M. K., and Tirrell, F. J. "Improving Educational Scores Through Self-Monitoring." *Journal of Educational Research* 71 (1977): 70-73.

New York State Education Department, Division of Occupational Education Instruction. *Measuring Student Achievement in Health Occupations Education.* Albany, N.Y.: Author, 1976. ED 139 818. MF-$0.96; HC-$2.36.

Oppenheim, A. N. *Questionnaire Design and Attitude Measurement.* New York: Basic Books, 1966.

Pace, C. R., and Associates. *Higher Education Measurement and Evaluation Kit.* Rev. Ed. Los Angeles: Laboratory for Research on Higher Education, UCLA, 1975.

Palola, E. G., and Lehemann, T. "Student Outcomes and Institutional Decision Making with PERC." In *Improving Educational Outcomes: New Directions for Higher Education,* edited by O. T. Lenning. San Francisco: Jossey-Bass, 1976.

_____, and Padgett, W. *Planning for Self-Renewal: A New Approach to Planned Organizational Change.* Berkeley, Calif.: Center for Research and Development in Higher Education, University of California, 1971.

Payne, D. A. *The Assessment of Learning: Cognitive and Affective.* Lexington, Mass.: Heath, 1974.

Pottinger, P., and Klemp, G. *The Fund for the Improvement of Postsecondary Education.* Final Report. Boston: McBer and Co., October 1975. ED 134 540. MF-$0.96; HC-$2.36.

_____. *Concepts and Issues Related to the Identification, Measurement and Validation of Competence.* Boston Mass.: McBer and Co., 1976. ED 134 539.

Rivas, F. W. "Hypothesis-Testing in Large-Scale Assessment." Paper presented at the Education Commission of the States Annual Conference on Large-Scale Assessment, Boulder, Colo., June 1976. ED 135 838. MF-$0.96; HC-$7.35.

Rowley, G. L. "Which Examinees Are Most Favored by the Use of Multiple Choice Tests?" *Journal of Educational Measurement* 11 (1974): 15-23.

Shannon, G. A. "The Construction of Matching Tests: An Empirical Statement." Paper presented at the annual meeting of the National Council on Measurement in Education, Washington, D.C., April 1975. ED 111 873. MF-$0.96; HC-$1.97.

Slotnick, H. B. "Toward a Theory of Computer Essay Grading." *Journal of Educational Measurement* 9 (1972): 253-263.

Smith, T. H. *Innovative Grading Practices: An Annotated Bibliography.* August 1976, ED 132 996. MF-$0.96; HC-$1.97.

Swenson, L. C. "The Effects of Reinforcing Self-Charting of Course Progress on Course Work Productivity in College Courses." Paper presented at the annual convention of the Western Psychological Association, San Francisco, April 1974. ED 110 909. MF-$0.96; HC-$1.97.

Thelin, J. R. "Beyond the Factory Model: New Strategies for Institutional Evaluation." *College and University* 51 (1976): 161-164.

Tull, D. S., and Albaum, G. S. *Survey Research: A Decisional Approach.* New York: Intext Educational Publishers, 1973.

Wagner, E. H. *Use of Student-Composed Tests and Their Effect on the Attitudes and Task Performance of University Students.* 1976. ED 129 754. MF-$0.96; HC-$1.97.

Webb, E. J. et al. *Unobtrusive Measures: Nonreactive Research in the Social Sciences.* Chicago: Rand McNally, 1966.

Whimbey, A. *Intelligence Can Be Taught.* New York: Bantam Books, 1976.

Witkin, B. R. *An Analysis of Needs Assessment Techniques for Educational Planning at State, Intermediate, and District Levels.* Hayward, Calif.: Office of Alameda County Superintendent of Schools, 1975. ED 108 370. MF-$0.96; HC-$10.55.

Wittmaier, B. C. "Student Reactions to Graded and Non-Graded Courses." Paper presented at the annual convention of the American Psychological Association, Washington, D.C., September 1976. ED 137 687. MF-$0.96; HC-$1.97.

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